TEST REPORT

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TEST SUMMARY

Objective

Assessment of supplied sample to AS4654.1

Project

Assessment of FORZAFLEX MINERALE 4.5 to AS 4654.1

Report Number

596-1 AS4654.1

Customer

NAME	FORSPEC PROTECTIVE COATINGS
ADDRESS	22/872 Canterbury Rd, Roselands 2196
CONTACT PERSON	James Gilto
EMAIL	James@forspec.com.au
TELEPHONE	02 8021 3517

Name of test material

FORZAFLEX MINERALE 4.5

Description of test material

Mineral finish bitumen torch on

Date of receipt of test material

30/03/2026

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Testing Facility and Location

NAME	XTec Gen Pty Ltd
ADDRESS	30-32 Park Avenue Woodville North 5012
ABN	22634729294

LIMITATION

The test results reported here relate only to the items tested.

CUSTOMER SUPPLIED INFORMATION & DATA

N/A

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the *XTecGen Test Request and Sample Submission Form*.

SIGNATORIES





Author	Reviewer
Ruby Scardigno	*Eric Scardigno*
Head Laboratory Technician	*Laboratory Manager*

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SUMMARY OF TESTS

AS4654.1 Requirements:

PROPERTY	METHOD	RESULT	ASSESSMENT CRITERIA	ASSESSMENT
Abrasion Resistance: non-trafficable	*AS 1580.403.2*	***0.045mm***	*AS 4654.1 Paragraph 2.3*	**Meets requirement for non-trafficable membrane**
Abrasion Resistance: trafficable	*AS 1580.403.2*	***0.509 mm***	*AS 4654.1 Paragraph 2.3*	**Does not meet the requirements for a trafficable membrane**
Acceptance of Cyclic movement	AS 4654.1 Appendix B	**Failure not observed**	AS 4654.1 Appendix B, Paragraph B4	**PASS**
Dimensional Stability	*†ASTM D6207*	***No changes observed***	*State result*	
Durability: Control Elongation at Break	*AS1145.3*	***40 %***	*AS 4654.1 Appendix A, Table A1*	**CLASS I**
Durability: Control Tensile Strength		***1.94MPa***	*State result*	
Durability[1]: Water Immersion Elongation at Break	*AS 4654.1 Appendix A*	***41%***	*AS 4654.1 Appendix A, Table A4*	**PASS**
Durability: Water Immersion Tensile Strength		***2.04 MPa***	*State result*	
Durability: Detergent Immersion Elongation at Break		***35%***	*AS 4654.1 Appendix A, Table A4*	**PASS**
Durability: Detergent Immersion Tensile Strength		***1.74 MPa***	*State result*	
Durability: Heat Aging Elongation at Break	*N/A*	***29%***	*AS 4654.1 Appendix A, Table A4*	**PASS**

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Durability: Heat Aging Tensile Strength	*UV Lamp*	***1.90 MPa***	*State result*	[redacted]
Durability: UV Exposure Elongation at Break		***25 %***	*AS 4654.1 Appendix A, Table A4*	**PASS**
Durability: UV Exposure Tensile Strength		***1.51 MPa***	*State result*	[redacted]
Field Seam Strength	*AMTM005*	***279.2N/25mm***	*State result*	
Temperature Resistance	*AMTM004*	***0.16 g/m^2/24 hours***	*State result*	
Water Vapour Transmission	*ASTM E96*	***0.02 g/m^2/24 hours***	*State result*	

† XTecGen Laboratory was not NATA accredited for at time of testing.

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ABRASION RESISTANCE: NON-TRAFFICABLE

Testing: Test carried out in accordance with AS 1580.403.2.

Additions, deviations and/or exclusions from AS1580.403.2:

Determination of abrasive wear performed as per AS4654.1, Paragraph 2.3.1

Results

Date of test: 26/05/2026

PARAMETER	VALUE
Abrasion assessment method	Depth of abrasion
Abrasive wheels: Model	CS-10
Panel 1 Abrasive wheels: Serial Number & Expiry Date	JX07C1- NOV 2026
Panel 2 Abrasive wheels: Serial Number & Expiry Date	JX07C1- NOV 2026
Mass applied to abrasive wheels	1000g
Model of abraser	Gester GT-C14B-2
Number of cycles per test panel	500

PANEL	READING	THICKNESS BEFORE ABRASION (mm)	THICKNESS AFTER ABRASION (mm)	LOSS OF MEMBRANE BUILD (mm)
1	1	3.658	3.629	0.029
	2	3.661	3.644	0.017
	3	3.631	3.564	0.067
2	1	3.745	3.658	0.087
	2	3.647	3.638	0.009
	3	3.698	3.636	0.062
Mean		3.673	3.628	0.045
Standard Deviation		0.017	0.043	0.031

Passing Requirement: "*When tested in accordance with AS 1580.403.2 using the CS-10 wheel with 500 cycles, for areas subjected only to maintenance access, the depth of abrasion shall be less than 0.2mm*"

Result: 0.045mm. This sample is suitable for areas subjected only to maintenance access.

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ABRASION RESISTANCE: TRAFFICABLE

Testing

Test carried out in accordance with AS 1580.403.2.

Additions, deviations and/or exclusions from AS 1580.403.2:

Determination of abrasive wear performed as per AS4654.1, Paragraph 2.3.2

Results

Date of test: 26/05/2026

PARAMETER	VALUE
Abrasion assessment method	Depth of abrasion
Abrasive wheels: Model	H-22
Panel 1 Abrasive wheels: Serial Number	NJT5B2
Panel 2 Abrasive wheels: Serial Number	NJT5B2
Mass applied to abrasive wheels	1000g
Model of abraser	Gester GT-C14B-2
Number of cycles per test panel	1000

PANEL	READING	THICKNESS BEFORE ABRASION (mm)	THICKNESS AFTER ABRASION (mm)	LOSS OF MEMBRANE BUILD (mm)
1	1	3.781	3.408	0.373
	2	3.703	3.156	0.547
	3	3.512	3.044	0.468
2	1	3.750	3.176	0.574
	2	3.875	3.341	0.534
	3	3.798	3.241	0.557
Mean		3.737	3.228	0.509
Standard Deviation		0.138	0.186	0.076

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Passing Requirement:

"*Abrasion resistance for trafficable shall be as follows:*

a) **When tested in accordance with AS 1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected only to pedestrian traffic, the depth of abrasion shall be less than 0.2mm.**
b) **When tested in accordance with AS1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected only to occasional service vehicle traffic, the depth of abrasion shall be less than 0.1mm.**
c) **When tested in accordance with AS 1580.403.2 using the H-22 wheel with 1000 cycles, for areas subjected to regular vehicle traffic, the depth of abrasion shall be less than 0.05mm."**

Result: 0.509mm. This sample does not pass the requirements for a trafficable membrane.

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CYCLIC MOVEMENT

Date of test: 18-22/05/2026

Testing:

Testing carried out in accordance with AS 4654.1 Appendix B "Assessment of resistance of waterproofing membranes to cyclic movement"

Additions, deviations and/or exclusions from AS 4654.1 Appendix B:

Nil

Test Parameters:

PARAMETER	VALUE
Membrane class	I
Number of cycles	50
Cycle time	2 Hours
Cycle expansion	0.4 mm
Sample Size	65 mm x 25 mm
Sample span	2 mm between plates
Sample thickness	3.75 mm

Test Results:

TEST RESULT	VALUE
Number of cycles completed	50
Surface crazing	Nil
Surface tears	Nil
Membrane rupture	Nil

Test Observations:

DAY	DATE	NUMBER OF CYCLES	Failure Observed		
			RUPTURE/HOLING		OTHER
1	18/05/2026	8	☐Yes	☒No	
2	19/05/2026	23	☐Yes	☒No	
3	20/05/2026	35	☐Yes	☒No	
4	21/05/2026	42	☐Yes	☒No	
5	22/05/2026	50	☐Yes	☒No	

Passing requirement: *"Any rupture holing the specimen or extending through the thickness for more than 1mm in from the edge of the specimen shall be taken as a failure and the number of cycles to failure shall be reported. If failure does not occur after 50 cycles it shall be reported together with the*

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types of any surface defects that have been induced and the number of cycles at which onset of the defect occurred"

Result: PASS Meets the requirement for CSIRO moving joint test as per AS 4654.1 Appendix B.

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DIMENSIONAL STABILITY

Date of test: 11-14/05/2026

Testing:

Testing carried out in accordance with ASTM D6207 “Standard Test Method for Dimensional Stability of Fabrics to Changes in Humidity and Temperature”

Additions, deviations and/or exclusions from ASTM D6207:

Nil

Test Parameters:

PARAMETER	MEASUREMENT INSTRUMENT	
Preconditioning temperature at 24Hrs	32°C	AMTE042A
Precondition humidity at 24Hrs	15%RH	AMTE042A
Method of sampling used	Test Specimens 150 by 800mm from lengthwise direction and width wise direction of the roll	

MEASUREMENT

	Widthwise mm	*Lengthwise mm*
Initial Pointer setting: Date: 11/05/2026	150mm	150mm
Reading at 95%RH & 20°C: Date: 12/05/2026	150mm	150mm
Reading At 15%RH & 32°C: Date: 13/05/2026	150mm	150mm
Reading at 95%RH & 20°C: Date: 13/05/2026	150mm	150mm
Reading At 15%RH & 32°C: Date: 14/05/2026	150mm	150mm

No Changes observed.

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DURABILITY OF MEMBRANE

CONTROL SET

Date of test: 9/04/2026

Testing: Test carried out in accordance with AS 1145.3.

Additions, deviations and/or exclusions from AS 1145.3: Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	23.6°C
Ambient humidity (testing)	59.4% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Video Extensometer
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Replicate	Sample thickness (mm)	Maximum Extension (mm)	Tensile Strength (MPa)	Elongation at Break (%)
1	3.84	16.0	2.27	32
2	3.79	20.8	1.80	42
3	3.89	22.3	1.98	45
4	3.83	21.6	1.77	43
5	3.71	18.2	1.90	36
Mean	3.81	19.8	1.94	40
Std Deviation	0.07	2.6	0.20	5

Requirement for Class III (high extensibility): ≥300% elongation at break

Requirement for Class II (medium extensibility) 60-299% elongation at break

Requirement for Class I (low extensibility) <60% elongation at break.

Classification: Class I

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DURABILITY OF MEMBRANE

WATER IMMERSION

Date of test: 16/04-4/06/2026

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

Additions, deviations and/or exclusions from AS 4654.1 Appendix A:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	22.4-22.8°C
Ambient humidity (testing)	42.6-47.6% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Video Extensometer
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Sample Number	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	3.70	19.6	2.23	39
2	3.71	24.9	1.67	50
3	3.72	19.2	1.72	38
7 Day Means	3.71	21.2	1.88	42
7 Day Std Devs	0.01	3.2	0.31	6
4	3.62	19.8	2.55	40
5	3.92	16.7	1.92	33
6	3.73	20.4	2.49	41
28 Day Means	3.76	19.0	2.32	38
28 Day Std Devs	0.15	2.0	0.35	4
7	3.78	23.0	1.80	46
8	3.79	17.5	2.04	35

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9	3.87	20.5	2.28	41
56 Day Means	3.81	20.4	2.04	41
56 Day Std Devs	0.05	2.7	0.24	5

Passing Requirement*: "Elongation at break shall not be less than 25% retention of elongation at break of the controls"58] Table 6.1. A failure is for less than 25% retention of elongation at break of the controls".*

To pass this condition an elongation at break value of 10% or greater is required.

Result: 41% PASS

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DURABILITY OF MEMBRANE

DETERGENT IMMERSION

Date of test: 16/04-4/06/2026

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

Additions, deviations and/or exclusions from AS 4654.1 Appendix A:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	22.4-22.8°C
Ambient humidity (testing)	42.6-47.6% RH
Minimum accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Video Extensometer
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results: Detergent Immersion

Sample Number	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	3.78	19.9	2.09	40
2	3.50	19.5	1.57	39
3	3.57	19.1	1.57	38
7 Day Means	3.62	19.5	1.74	39
7 Day Std Devs	0.15	0.4	0.30	1
4	3.78	35.8	2.14	72
5	3.69	28.6	1.91	57
6	3.70	27.7	1.89	55
28 Day Means	3.73	30.7	1.98	61
28 Day Std Devs	0.05	4.4	0.14	9
7	3.78	14.8	1.74	30
8	3.59	17.8	1.36	35

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9	3.65	20.3	2.12	41
56 Day Means	3.67	17.6	1.74	35
56 Day Std Devs	0.10	2.8	0.38	6

Passing Requirement: *"Elongation at break shall not be less than 25% retention of elongation at break of the controls".*

To pass this condition an elongation at break value of 10% or greater is required.

Result: 35% PASS

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DURABILITY OF MEMBRANE

HEAT AGING

Date of test: 29/04/2026

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

Additions, deviations and/or exclusions from AS 4654.1 Appendix A:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	23.1°C
Ambient humidity (testing)	47.4% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Video Extensometer
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Number of replicates	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	3.81	13.7	1.67	27
2	3.74	13.2	1.99	26
3	3.66	16.3	2.04	33
Mean	3.74	14.4	1.90	29
Std Deviation	0.08	1.7	0.20	3

Passing Requirement*: "Elongation at break shall be not less than 50% of the result recorded for the controls ".*

To pass this condition an elongation at break value of 20% or greater is required.

Result: 29% PASS

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DURABILITY OF MEMBRANE

ULTRAVIOLET EXPOSURE

Date of test: 4/06/2026

Testing:

Test carried out in accordance with AS 4654.1 Appendix A.

Additions, deviations and/or exclusions from AS 4654.1 Appendix A:

Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	22.4°C
Ambient humidity (testing)	42.6% RH
Accuracy grading of test machine	A
Specimen type	Type 2
Elongation measurement type:	Video Extensometer
Clamping device:	Pneumatic jaws
Testing speed:	50mm/min

Test Results:

Number of replicates	Sample thickness (mm)	Maximum Extension (mm)	Tensile strength (MPa)	Elongation at break (%)
1	3.75	12.3	1.73	25
2	3.77	14.5	1.39	29
3	3.89	11.1	1.40	22
Mean	3.80	12.6	1.51	25
Std Deviation	0.08	1.7	0.19	3

Passing Requirement*: "Elongation at break shall be not less than 40% of the result recorded for the controls ".*

To pass this condition an elongation at break value of 16% or greater is required.

Result: 25% PASS

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FIELD SEAM STRENGTH

Date of test: 20/05/2026

Testing: Test carried out in accordance with AMTM005.

Additions, deviations and/or exclusions from AMTM005: Nil

Test Parameters:

PARAMETER	VALUE
Ambient temperature (conditioning)	23.4-24.3°C
Ambient humidity (conditioning)	50.2-53.4% RH
Ambient temperature (testing)	22.7°C
Ambient humidity (testing)	51.7% RH
Accuracy grading of test machine	A
Elongation measurement type:	Electronic internal measurement
Clamping device:	Pneumatic jaws
Testing speed:	100mm/min

Test Results:

Replicate	Peak Force (N/25mm)	Mode of Failure	
		Lap joint	Sheet
1	269.83	☐	☒
2	242.32	☒	☐
3	316.56	☐	☒
4	301.78	☐	☒
5	265.49	☒	☐
Mean	279.20		
Std Deviation	29.75		
Number of Failures		2	3
% Failure		40	60

Result 279.20 N/25mm

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TEMPERATURE RESISTANCE

Date of test: 20/04-4/05/2026

Testing: Test carried out in accordance with AMTM004.

Additions, deviations and/or exclusions from AMTM004: Nil

Test Parameters:

PARAMETER	VALUE
Cold exposure: 13-15/04/26	-16.3 - -15.1°C
Heat exposure: 15-17/04/26	85°C
WVT: Test temperature	23.2-24.3°C
WVT: Test humidity	43.0-52.7% RH
WVT: Cup design	Round, anodised aluminium cup
WVT: Cup sealant	Paraffin wax
WVT: Desiccant	Anhydrous Calcium Chloride

Test Results- Temperature Resistance

SAMPLE	THICKNESS (mm)	SIDE OF SPECIMEN HIGHER VAPOUR PRESSURE WAS APPLIED TO	REGRESSION		WATER VAPOUR TRANSMISSON RATE (g/m^2/24 hours)
			EQUATION	r^2 VALUE	
1	4.21	Side A, top of cast film	$Mass_{(g)}=0.00002(Time_{hr})+178.45$	0.907	0.14
2	4.07	Side A, top of cast film	$Mass_{(g)}=0.00002(Time_{hr})+177.35$	0.9363	0.14
3	4.17	Side B, bottom of cast film	$Mass_{(g)}=0.00002(Time_{hr})+200.00$	0.8681	0.14
4	4.09	Side B, bottom of cast film	$Mass_{(g)}=0.00003(Time_{hr})+174.8$	0.9642	0.22
Mean	4.14				0.16
Std Deviation	0.06				0.04

Result: 0.16 g/m^2/24 hours.

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WATER VAPOUR TRANSMISSION RATE

Date of test: 8-22/04/2026

Testing:

Test carried out in accordance with ASTM E96 Desiccant Method.

Additions, deviations and/or exclusions from ASTM E96 Desiccant Method:

Nil

Test Parameters:

PARAMETER	VALUE
Test temperature:	23.0-24.3°C
Test humidity:	48.9-56.8% RH
Cup design:	Round, anodised aluminium cup
Sealant:	Paraffin Wax
Desiccant:	Anhydrous Calcium Chloride

Test Results

SAMPLE	THICKNESS (mm)	SIDE OF SPECIMEN HIGHER VAPOUR PRESSURE WAS APPLIED TO	REGRESSION		WATER VAPOUR TRANSMISSION RATE (g/m^2/24 hours)
			EQUATION	r^2 VALUE	
1	3.94	Side A, top of cast film	$Mass_{(g)}$=-0.000001($Time_{hr}$)+200.68	0.0076	-0.01
2	3.92	Side A, top of cast film	$Mass_{(g)}$=0.0000008($Time_{hr}$)+176.28	0.0008	0.01
3	4.10	Side B, bottom of cast film	$Mass_{(g)}$=0.000005($Time_{hr}$)+185.11	0.1529	0.04
4	4.11	Side B, bottom of cast film	$Mass_{(g)}$=0.000005($Time_{hr}$)+176.63	0.1688	0.04
Mean	4.02				0.02
Std Deviation	0.10				0.02

Result: 0.02 g/m^2/24 hours.

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Report number	Issue Date	Expiry Date
596-1 AS 4654.1	5/06/2026	5/06/2029

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END OF REPORT

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